

From: [BAYUK Dana](#)
To: [Sean Sheldrake/R10/USEPA/US@EPA](#)
Cc: [Chip Humphrey/R10/USEPA/US@EPA](#); [Kristine Koch/R10/USEPA/US@EPA](#); [PetersonLE@cdm.com](#)
Subject: RE: Latest draft EPA tph letter
Date: 03/01/2011 07:57 AM

Good morning Sean...I was out of the office yesterday afternoon. Let me talk with Mike and Henning this morning and I'll get back to you.

Mr. Dana Bayuk, Project Manager
Cleanup & Portland Harbor Section
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201
E-mail: bayuk.dana@deq.state.or.us
Phone: 503-229-5543
FAX: 503-229-6899

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-----Original Message-----

From: Sheldrake.Sean@epamail.epa.gov [mailto:Sheldrake.Sean@epamail.epa.gov]
Sent: Monday, February 28, 2011 12:11 PM
To: BAYUK Dana
Cc: Humphrey.Chip@epamail.epa.gov; Koch.Kristine@epamail.epa.gov; PetersonLE@cdm.com
Subject: Latest draft EPA tph letter

Dana,

EPA is getting ready to send the letter to NWN. Let me know if you have any questions or concerns.

Thank you.

S

February 21, 2011

RE: TPH Evaluation, Administrative Settlement Agreement and Order on Consent for Removal Action, EPA Region 10, CERCLA Docket No. 10-2004-0068, Gasco Sediments Site within the Portland Harbor Superfund Site

Dear ____:

This letter summarizes the evaluation of TPH in the draft baseline human health and ecological baseline risk assessments (BHHRA and BERA) at the Portland Harbor Superfund site and makes recommendations for the use of TPH-G in the evaluation of remedial action alternatives at the Gasco early action site. The following documents were reviewed to generate the information in this letter:

- Draft BERA, August 2009
- Draft BHHRA, September 2009
- Benthic Approach Reanalysis Technical Memorandum, November 2009
- EPA preliminary comments on the BHHRA and BERA, December 2009
- EPA letter regarding the use of Preliminary Remediation Goals (PRGs) in the Portland Harbor Feasibility Study (FS), April 2010
- EPA comments on the draft BERA and BHHRA, July 2010
- EPA comments on the benthic risk evaluation, September 2010
- Lower Willamette Group (LWG) responses to directed comments on the BHHRA and BERA, September 2010
- LWG responses to non-directed comments on the BHHRA and BERA, November 2010
- LWG response to various EPA comments on the draft Portland Harbor Remedial Investigation (RI), BHHRA, BERA reports and the Portland Harbor FS, January 2011

The methods for evaluating TPH risk at the Portland Harbor site are presented below for both the BHHRA and BERA.

BERA:

TPH was evaluated in the screening level ecological risk assessment (SLERA). The screening step is presented in Attachment 5 and summarized in Tables 5-1 through 5-4 of the draft BERA. Based on the results of the screening step, TPH-G was identified as a contaminant of potential concern (COPC) in transition zone water (TZW) and TPH-G, TPH-D and TPH-R were identified as COPCs for sediment. TPH was not identified as a contaminant of interest (COI) or COPC for surface water nor was TPH identified as a COPC for wildlife.

EPA's position in the BERA is that if a contaminant was identified as a COPC in the SLERA, but could not be evaluated further for any reason in the BERA (e.g. no additional sampling data to evaluate, BERA toxicity reference value not available), any COPC identified in the SLERA is also identified as a contaminant posing potentially unacceptable ecological risks at the conclusion of the risk characterization of the BERA. Transition Zone Water:

The screening level ecological risk assessment (SLERA) is presented in Attachment 5 of the draft BERA. Water Toxicity reference values (TRVs) for the evaluation of TPH in TZW are presented in Attachment 10 of the draft BERA. Based on the results of the SLERA, TPH-G was identified as a COPC in TZW for the following receptor groups: benthic community, fish, and plants and amphibians. The TZW evaluation considered a range of TPH constituents as outlined below:

Aliphatic C4-C6 HC (TRV = 128 ug/l)
Aliphatic C6-C8 HC (TRV = 54 ug/l)
Aliphatic C8-C10 HC (TRV = 9.5 ug/l)
Aliphatic C10-C12 HC (TRV = 2.6 ug/l)
Aromatic C8-C10 HC (TRV = 212 ug/l)

The TRVs and results of the screen are presented in Table 6-4 of the SLERA (Attachment 5 of the BERA). Table 6-4 includes the following footnote: "EPA provided TRVs for five of the chemical groups that are blended to form gasoline (EPA 2008a). Average fractions of these components in gasoline were used to convert the total gasoline-range hydrocarbon concentration into gasoline fraction concentrations for comparison with the TRVs. Average fractions were derived from the literature (Fagerlund and Niemi 2003). Any one gasoline fraction exceeding its TRV was grounds for identifying gasoline as a COPC." This resulted in TPH-G (rather than the fractions identified above) being carried forward into the BERA as a COPC as presented in Tables 6-5 and 6-6 of the SLERA.

Based on the screening results, TPH-G was identified as a COPC in TZW for the benthic community, fish, and plants and amphibians. Discussions between EPA and LWG resulted in an agreement not to consider the Alaska TPH-D water benchmark in the BERA, while no Alaska TPH-R water benchmark can be calculated. However, in the draft BERA, the LWG eliminated the TZW line of evidence (LOE) based on uncertainty and did not identify TPH-G as posing a risk to ecological receptors. In EPA's preliminary comments on the BERA, EPA directed the LWG to include the TZW LOE in the BERA and agreed to allow evaluation of the uncertainty of the TZW LOE in the risk characterization. This is documented in the LWG responses to directed comments on the draft BHHRA and BERA (September 2010). In the LWG directed comment response, the LWG agreed to include TZW as a LOE for lamprey and sculpin populations and the benthic invertebrate community. It is worth noting that TPH-G was identified as a contaminant of concern (COC) at the following sites: ARCO, Exxon Mobil, Gasco, Kinder Morgan, Siltronic and Willbridge; clearly, this is not an issue that is limited to the Gasco site.

Sediments:

For sediments, TPH-G, TPH-D and TPH-R were screened based on a comparison to TPH TRVs developed for the State of Alaska. The justification for the use of the Alaska values is summarized in Appendix A to the Portland Harbor BERA Toxicity Reference Values (April 2008). As a result, TPH-G, TPH-D and TPH-R were identified as COPCs in sediment for the benthic community. However, the LWG's draft BERA eliminated the generic (literature based) sediment quality guideline (SQG) line of evidence based on a reliability analysis. In its comments on the BERA, EPA stated it was inappropriate for LWG to eliminate any line of evidence identified in the February 15, 2008 Problem Formulation document from the risk characterization and its conclusions. Furthermore, EPA's preliminary comments on the draft BERA stated that all COCs with hazard quotients greater than or equal to 1 must be identified as potentially posing unacceptable risk. As a result, the conclusion EPA draws from the BERA is that TPH-G, TPH-D and TPH-R potentially pose unacceptable risk.

In April, 2010, EPA provided direction to the LWG on the PRGs that will be used in the draft FS. Because EPA had not completed its review of the revised benthic risk evaluation, EPA identified a mix of generic and site specific (based on the floating percentile model (FPM)) SQGs as PRGs. The Alaska TPH TRVs were not included in the list of PRGs. In its letter, EPA also stated that EPA expected to develop a benthic approach based on review of the revised benthic risk evaluation.

In September 2010, EPA provided comments on the benthic risk evaluation. These comments did not address TPH and focused on the site specific predictive models and the application of generic SQGs. Regarding the use of generic SQGs, EPA stated that an evaluation of sediment chemistry using generic SQGs should be included in the risk characterization for benthic invertebrates and that published reliability criteria for generic SQGs such as probable effects concentrations (PECs) (MacDonald et al. 2000) largely meet LWG's proposed reliability criteria. Regarding the use of the site specific models, EPA directed the LWG to use the results of the logistic regression model (LRM) developed by Jay Field with NOAA and provided specific comments on the development and application of the floating percentile model.

During subsequent discussions, culminating with a meeting on December 13, 2010, EPA and the LWG reached agreements on many elements on the evaluation of benthic risk at the Portland Harbor Site. In the LWG's January 12, 1011 response letter, the LWG summarizes these agreements. Regarding the use of generic SQGs at the Portland Harbor site, the LWG states although EPA to date has not agreed with the two LWG statements below, that:

- The generic SQGs that will be used moving ahead in the BERA are PECs and probable effects levels (PELs) (including mean quotients). This is based on EPA's verbal recommendation during our November-December 2010 meetings to resolve the benthic approach. Threshold effects concentrations (TECs) and threshold effects levels (TELs) may still be used to define clean areas (as in the draft BERA). The PECs and PELs will be used to

confirm that the site-specific LRM and FPMs are better than generic SQGs at predicting benthic toxicity in Portland Harbor, based on a comparison of false positive and false negative rates. Once that has been documented, the rest of the risk characterization will be based on the LRM and FPM SQGs.

At this time, EPA has not agreed to eliminate from the BERA any SQGs identified in the February 15, 2008 Problem Formulation for the Ecological Risk Assessment. The complete BERA Problem Formulation includes the subsequent April 11, 2008 TRV tables, which were to be considered the effects assessment portion of the BERA. Included in the April 11, 2008 TRVs were the TPH TRV's for water which corresponded to State of Oregon definitions for TPH fractions, which differed from the State of Alaska defined TPH fractions used in the SLERA. SQGs identified in the Problem Formulation include: Consensus based SQGs (TECs/PECs and associated quotients); Mechanistic-based SQGs (Equilibrium partitioning); and Empirical SQGs (PELs/TELS, ERLs/ERMs, AETs, LRM and related quotients). The Alaska sediment TPH TRV values were not identified in the Problem Formulation, nor were any other sediment TPH ecological TRVs. Thus, as stated earlier in this letter, the COPC's identified in the SLERA, including the TPH-G, TPH-D and TPH-R fractions identified as SLERA COPC's through exceedances of the Alaska sediment TPH values are to be considered contaminants posing potentially unacceptable ecological risks at the conclusion of the BERA.

Regarding application of the site specific models, it was agreed on December 13th, that the floating point model did not need to consider TPH. This agreement was based in part on the fact that the LRM considered both TPH-D and TPH-R and found that TPH-D concentrations in sediment could be used to predict sediment toxicity. Regarding TPH-G, a review of the FPM supporting information indicates that TPH-G was only detected in 21 of the 293 bioassay samples. BERA data rules used to identify contaminants which potentially could be incorporated into the FPM required a minimum of 30 detected values before a contaminant was considered for inclusion into the FPM. The low detection frequency of TPH-G in sediment was the basis for TPH-G not being incorporated into the sitewide FPM.

TPH BERA Conclusions:

TPH-G should be evaluated in TZW at the Gasco early action site to ensure that site remedies are protective of the benthic community and fish species that come into contact with TZW such as lamprey and sculpin. TPH-G in TZW may be used in the Portland Harbor FS and early action sites to evaluate remedy effectiveness. For example, meeting TPH-G criteria in TZW may be considered during the effectiveness evaluation of capping remedies.

For sediment, the Alaska TPH TRVs (TPH-G, TPH-D and TPH-R) should be used as screening values and the evaluation of benthic risk should be performed based on empirical bioassay results, the application of the site specific models (i.e., floating percentile and logistic regression models) and generic SQGs based on PECs, PELs, TECs and TELs. TPH-D was identified as a predictor of benthic toxicity by the LRM.

BHHRA:

Various types of TPH were screened in the BHHRA. This information is presented in Table 2-12 of the BHHRA. A summary of the screening step is provided below:

Hydrocarbon Type	Maximum Concentration (mg/kg)	Screening Level (mg/kg)	Screening Level Source	Retained as COPC?
Diesel Range	20,000	70,000	Oregon Dept. of Environmental Quality (ODEQ) Occupational Soil Diesel Risk-based Concentration (RBC)	No
Gasoline Range	260	22,000	ODEQ Occupational Soil Gasoline RBC	No
Lube Oil	9,400	100,000	ODEQ Occupational Soil Oil RBC	No
Motor Oil	130	100,000	ODEQ Occupational Soil Oil RBC	No
Residual Range	18,000	100,000	ODEQ Occupational Soil Oil RBC	No

In no case did the maximum detected concentration of TPH exceed the ODEQ screening values. As a result, TPH was not evaluated further in the BHHRA.

TPH BHHRA Conclusions:

TPH is not a COPC for the evaluation of human health risk assessment based on the results of the screening level evaluation. Review of the sediment data offshore of the Gasco site suggests that there is sufficient TPH data to conclude that the screening level values were not exceeded offshore of the Gasco site.

Using TPH-D and TPH-R as a surrogate for the risk posed by TPH-G.

TPH was generally included in the analyte list at sites where petroleum releases were suspected (e.g., Gasco, bulk fuel facilities). According to the Portland Harbor RI data base, 1,620 sediment samples collected at the Portland Harbor site were analyzed for NWTPH-Gx; 416 samples had positive detections. TPH-G was not considered in the development of either the LRM or the FPM due to the low frequency of detection (21 detections in 293 samples) in the bioassay sample data set. However, the LRM considered both TPH-D and TPH-R to develop a predictive relationship between sediment chemistry and sediment toxicity. TPH-D was the only petroleum hydrocarbon fraction found to be a predictor of sediment toxicity. At this time, there does not appear to be a need for using TPH-D and TPH-R as a surrogate for the risk posed by TPH-G. Rather, TPH-D should be used to evaluate risk to the benthic community associated with petroleum hydrocarbons. TPH-D is the only petroleum hydrocarbon chemical class detected in sediment that was found to present a potential risk to ecological receptors (the benthic community) based on current agreements regarding the benthic risk evaluation.

It should be noted that risks to the benthic community as measured through sediment bioassays are the result of exposure to a mixture of contaminants. It is often not possible to identify a specific contaminant that is causing the observed toxicity. Similarly, for the predictive models, it is not possible to consider only one contaminant (e.g., TPH-G) or one class of chemicals (e.g., petroleum hydrocarbons) to predict toxicity. Rather, the prediction of toxicity is based on consideration of a multitude of contaminants. This is documented in the LWG's January 12, 2011 letter: "EPA and the LWG recognize that the sediment quality guidelines produced by any model (LRM, FPM or generic SQGs such as PECs or PELs) are intended to be used as a set - not individually."

Summary

- TPH in sediments do not pose an unacceptable risk to human health at the Portland Harbor site.
- TPH-G may pose a risk to the benthic community, sculpin and lamprey as a result of exposure to TZW. As a result, TPH-G should be considered in the evaluation of Gasco remedial action alternatives from the standpoint of TZW.
- Alaska TPH TRVs for the protection of the benthic community are exceeded in Gasco sediment for TPH-G, TPH-D and TPH-R.
- The LRM determined that TPH-D concentrations in sediment should be considered in predicting the probability of benthic toxicity. TPH-G was not detected with sufficient frequency in the bioassay data set to develop a predictive relationship. As a result, based on current agreements, the evaluation of contaminated sediments in the Portland Harbor site only needs to consider TPH-D.
- TPH-G was measured in over 1,600 sediment samples at the Portland Harbor site. TPH-G was detected in over 400 of these samples. It appears that the Portland Harbor site (including sediments offshore of the Gasco facility) was adequately characterized for TPH-G.

The TPH TRV derivation methodology used by EPA to derive both the Alaska and Oregon TPH benchmarks incorporates a great deal of flexibility in its ability to derive TRVs for a wide variety of TPH fractions. EPA would be pleased to hold discussions with NW Natural and Siltroinc Corporation regarding recalculation of ecological TPH TRVs for sediment and water so that the TRV's would correspond to the TPH analytical fractionation methodology NW Natural and Siltroinc Corporation proposes to use during any future sampling at the site and to ensure that the TPH evaluation approach is consistent with the harbor-wide evaluation approach.

Sincerely,

Sean Sheldrake, RPM, Unit Diving Officer
USEPA, Region 10
Environmental Cleanup Office
1200 Sixth Avenue, Suite 900, ECL-110
Seattle WA 98101-3140
sheldrake.sean@epa.gov
Phone: 206/553-1220
Region 10 Dive Team:
<http://yosemite.epa.gov/r10/oea.nsf/webpage/dive+team>
Portland Harbor Cleanup: www.epa.gov/region10/portlandharbor
Green Cleanups:
<http://yosemite.epa.gov/R10/extaff.nsf/programs/greencleanups>

Green Cleanups (EPA only):
<http://204.47.216.153:9876/r10/infopage/cleanup.nsf/webpage/greener+cleanups>
Deliveries: Parking Garage mailroom (1st floor)
Visitors: Check-in @ PERC / Service Center on 12th floor:
<http://yosemite.epa.gov/r10/extaff.nsf/PERC/Visiting+Seattle>